DOCUMENT RESUME

ED 438 095 PS 028 301

AUTHOR Graitcer, Philip L.; Lerer, Leonard B.
TITLE Child Labor and Health: Quantifying the Global Health Impacts of Child Labor.
INSTITUTION World Bank, Washington, DC.
PUB DATE 1998-11-00
NOTE 38p.
AVAILABLE FROM World Bank, 1818 H Street, N.W., Washington, DC 20433. Tel: 202-473-3427; Fax: 202-522-3233.
PUB TYPE Information Analyses (070) -- Reports - Descriptive (141)
EDRS PRICE EDRS Price MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Child Labor; Child Welfare; *Children; *Costs; Developed Nations; Developing Nations; Economic Factors; Foreign Countries; *Injuries; *Mortality Rate; Occupational Safety and Health; Research Needs; Research Problems; Social Change

ABSTRACT

Child labor remains one of the most controversial challenges at the end of the 20th century. Approximately 250 million children in developing countries work either full- or part-time. Child labor is not confined to less-developed countries, as economic transitions bring shifts in the prevalence and nature of child labor. Throughout the world, occupational injury and mortality rates for children exceed those of adults. Yet, data on the extent of child labor and the associated burden of injury and disability are often of poor quality. An estimated 6 million work-related injuries occur among children that result in 2.5 million disabilities and 32,000 fatalities each year. Using data derived from the Global Burden of Diseases Study (GBDS), estimates of child occupational mortality rates by region were found to be comparable with adult mortality rates, indicating that the conditions in which children work are as dangerous as, or more dangerous than, those in which adults work. Using either the human capital or willingness-to-pay calculations, estimates of economic impact of child labor-related mortality can be made. Depending on the estimate method used, the annual cost of child labor-related mortality in India, for example, lies between 101 million and 2.43 billion U.S. dollars. Intervention to reduce the societal and economic impact of child labor can be directed at either reducing the supply and demand for child labor or by maximizing the best possible health outcomes for children. Addressing properly the global problems of child labor requires an aggressive research agenda directed toward improving the quality of the data, improving monitoring and surveillance, understanding implications of the changing nature of work, understanding social and institutional issues, and identifying innovative intervention solutions. (Contains 84 references.) (HTH)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 438 095

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Early

CHILD LABOR AND HEALTH: QUANTIFYING THE GLOBAL HEALTH IMPACTS OF CHILD LABOR

Philip L. Graitcer

and

Leonard B. Lerer

J. Feather

2A

November 1998

BEST COPY AVAILABLE

PS 028301

EDUCATION
THE WORLD BANK

CHILD LABOR AND HEALTH:

QUANTIFYING THE GLOBAL HEALTH IMPACTS OF CHILD LABOR

Philip L. Graitcer, DMD, MPH

and

Leonard B. Lerer, MD, MMed, MBA

November, 1998

Table of Contents

List of Boxes, Tables, Figures iv
Executive Summary iv
I. The Challenge of Child Labor 2
I.1. The current situation 2
1.2. Definitions, data sources and data quality 3
II. Quantifying the Burden of Mortality, Nonfatal Injury and Disease Caused by Child Labor 5
II.1. Categories of Hazardous Child Labor 7
II.1.a. Agriculture 7
II.1.b. Manufacturing 8
II.1.c. Household Services 8
II.1.d. Forced and Bonded Labor 8
II.1.e. Sex Trade 8
II.1.f. Street Work 8
II.1.g. Service Industries 9
III. The Epidemiology of Child Labor 9
III.1. Estimating the burden of disease due to child labor 10
IV. Economic Approaches To The Health Impacts Of Child Labor 13
IV.1. Examples of the application of economic valuation methods in estimating the health impacts of child labor 15
V. Child Labor And Health – Some Issues And Trends 16
V.1. Globalization and economic transition 16
V.2. Technology 17
V.3. Environmental Hazards and Pollution 17
V.4. Violence and high-risk behaviors 18
VI Health Impacts Of Child Labor On Economic And Social Development 18
VI.1. Child labor and social capital 18
VI.2. Women, children and work 19
VI.3. Child labor, education and health 19
VI.4. The benefits of work for teenagers 19
VII. Exploring Effective Avenues For Intervention 20
VII.1. Reducing the supply of child labor 20
VII.2. Reducing the demand for child labor 20
VII.3. Ensuring the best possible health outcomes for working children 21
VIII. Priorities For Further Research On Child Labor 22
VIII.1. Improving the quality of data on child labor 22
VIII.2. Improving the monitoring and surveillance of child labor 22
VIII.4. Research into the social and institutional issues surrounding child labor 23
VIII.5. Seeking innovative solutions, assessing interventions and searching for success stories 23
ANNEX 1 24
References 26

List of Boxes, Tables, Figures

Box 1: Summary Data on the Prevalence of Child Labor 4
Box 2: Types of injuries and time off work in the US and in developing countries 5
Box 3: Health impacts of child labor stratified by industry sector 6
Box 4: Injuries and Heath Impacts – Young Workers in Service Industries 9
Table 1: Prevalence of Child Labor by Region: Estimates of Morbidity and Mortality 9
Table 2: Estimating the Extent of Child Labor Related Injury, Disability and Death in India 11
Table 3: Comparison of mortality rates for child and adult labor by GBDS region 12
Table 4: Childhood work-related burns in India 13
Table 5: Valuation of mortality due to child labor in India 15
Table 6: Valuation of mortality and injury due to child labor in the South African agricultural sector 16
Figure 1: Wages and Particulate Pollution in China 18
Box 5: Reasons why 301 Massachusetts teenagers surveyed from 1994 – 1997 worked part-time. 20
Figure 2: The relationship between child labor and GDP per capita 21
Box 6: Minimum data requirements for research into the health impacts of child labor 23

Executive Summary

Child labor remains one of the most evocative and controversial challenges facing the world at the end of the 20th Century. At least 120 million children in developing countries work full-time. When part-time work is included, this figure rises to 250 million. Child labor is not confined to less-developed countries. Economic transition brings with it shifts in the prevalence and nature of child labor. In the former socialist economies and in Asia the number of children engaged in labor is increasing. In the US, child labor has increased due to a number of social, economic, and demographic factors.

Throughout the world, occupational injury and mortality rates for children exceed those of adults. Yet, data on the extent of child labor and the associated burden of injury and disability are often of poor quality. In those countries with the highest numbers of working children, definitional issues, resource constraints, and attempts to hide illegal child labor contribute to data limitations. We estimate that there are 6 million work-related injuries in children that result in 2.5 million disabilities and 32,000 fatalities each year. Using data derived from the Global Burden of Diseases Study (GBDS) we estimated child occupational mortality rates by GBDS region and found them to be comparable with adult mortality rates, indicating that children work under equally or more dangerous conditions than adults.

Data on the economic aspects of child occupational injury are unavailable, however, using either the human capital or willingness to pay calculations, estimates can be made. Depending on the estimate method used, the annual cost of child labor-related mortality in India lies between 101 million and 2.43 billion dollars US.

Interventions to reduce the societal and economic impact of child labor can be directed at either reducing the supply and demand for child labor or by maximizing the best possible health outcomes for children. To properly address the global problems of child labor, an aggressive research agenda needs to be undertaken and directed towards improving the quality of the data, improving monitoring and surveillance, understanding the implications of the changing nature of work, understanding social and institutional issues, and identifying innovative intervention solutions.

I. The Challenge of Child Labor

Child labor remains one of the most evocative and controversial challenges facing the world at the end of the 20th Century. The working child, thought to represent all that was unjust and exploitative of industrialization over a century ago, is still with us today, even in technologically advanced societies. Furthermore, child labor's inexorable linkages with poverty, education, health and gender highlight the need for broad-based social and economic progress. The sheer size and ramifications of the child working population in many poorer countries has spurred extensive review and policy initiatives from the World Bank (Fallon and Tzannatos 1998, UNICEF 1997, US Department of Labor 1994, 1995, 1996). The 1997 *State of the World's Children* (UNICEF 1997) focused on hazardous and exploitative child labor, and described barriers to as well as opportunities for reducing the negative impact of child labor. International legal positions have been extensively reviewed, as has progress toward the ratification of various treaties for the protection of children (Fallon and Tzannatos 1998, International Conference on Child Labour 1997). The International Labor Organization (ILO) has an active portfolio of activities in this arena and a specific program, the International Program for the Elimination of Child Labor (IPEC), that focuses on data collection and programs for the elimination of hazardous child labor (Forastieri 1997).

Although child labor is recognized as a global health problem, research into the health impacts of child labor has, to date, been limited. Some general data describing the prevalence of child labor and corresponding injury rates are available, but, to our knowledge, this study constitutes the first comprehensive review by world region of the impact of child labor on health. In this report we summarize existing information and, by extrapolating data from the Global Burden of Disease Study (GBDS) (Murray and Lopez 1996a, 1996b), we estimate the mortality, morbidity and disability associated with child labor. We discuss the economic implications of these health impacts on growth and development, and provide some examples of cost estimates, both in terms of the statistical value of lives lost and in health costs. In the final section of this report, we suggest some fruitful avenues for further research to quantify the health impacts of child labor and to design effective interventions.

I.1. The current situation

At least 120 million children in developing countries work full-time. When part-time work is included, this figure rises to 250 million working children (Forastieri 1997). In Africa, about 40% of all children between 5 and 14 are doing some form of work. In fact, in most countries with a Gross Domestic Product (GDP) per capita of $500 and less, economically active children comprise a significant proportion of the total labor force. In these countries, between 30-60% of the children are in the labor force (Lemen et al. 1993; Fallon and Tzannatos 1998).

Child labor is not confined to less-developed countries. Economic transition brings with it shifts in the prevalence and nature of child labor. The former socialist economies, for example, are seeing an increase in the number of children engaged in economic activity. In Asia, it remains to be seen what the consequences for child labor will be as a result of ongoing Asian economic turmoil. The USA has seen a resurgence of child labor due to a range of factors. These include

household poverty levels, changes in labor market demographics, the availability of low-skilled jobs in the service sector, and a relaxation of regulation, inspection and enforcement of child labor laws (Postol 1993, Landrigan 1993, Landrigan et al. 1995; Academy of Pediatrics 1995, Landrigan et al. 1998). Even in countries with comprehensive occupational health and safety and child labor regulations, children may be employed illegally (Cooper and Rothstein 1995). Children employed illegally are at least 10 times more at risk of injury than those working under legally sanctioned conditions (Landrigan and Belville 1993). **Box 1** summarizes some of the currently available data on the global nature and extent of child labor.

1.2. Definitions, data sources and data quality

Child labor is generally regarded as the employment of children less than 18 years of age (Landrigan et al. 1998). If possible, age categories must be further stratified, since the health and educational implications of work for a 17-year-old differ substantially from those for a 10-year-old. Not all working children are paid for their work; many are doing "domestic work" or in bonded labor, unpaid "apprenticeships" or as slaves. There is no consistently reliable, updated source of data on child labor. Most reports rely on anecdotal evidence or limited cross-sectional studies (US Department of Labor 1995; International Conference on Child Labour 1997).

Box 1: Summary Data on the Prevalence of Child Labor

	Prevalence data	Source
Global data	250 million children, 5 – 14 years, are working in developing countries. At least 120 million of these children are working on a full-time basis. This is about 15-20% of the total number of children in this age category.	Fallon and Tzannatos 1998; Ashagrie 1997a; UNICEF 1997;
Regional data	Distribution of economically active children, 5-14 years, in developing regions: Africa 44%, Asia 46%, Latin America 7% Participation rates* for various regions**: Africa 22 -41%, Asia 15 –22%, Latin America 8-16%	Ashagrie, 1997a; Various sources quoted by Fallon and Tzannatos 1998; US Department of Labor 1994
Country Specific data	Participation rates*, 10-14 years, in selected countries Nepal 57%, Bangladesh 52%, Senegal 50%, Ethiopia 42% Total number of working children: India: 44 million (range 18 – 100 million***); Bangladesh: 6- 15 million, Mexico: 8 –11 million, Pakistan: 2 – 19 million***, Philippines: 5 – 6 million, Portugal: 30 – 200 000*** , Thailand: 4 – 5 million	WHO 1987; US Department of Labor 1994, ILO databases, Lemen et al 1993
Sectoral data	Child labor in major sectors (survey data from 26 countries): Agriculture 70%, Manufacturing 8%, Trade and entertainment 8%, Export manufacturing 5%, Export-oriented agriculture 2%. Prevalence of children engaged in "sex-work": India 400 000, Thailand 300 000, USA 100 000, Brazil 200 000	Ashagrie 1997a, Fallon and Tzannatos 1998 US Department of Labor 1996
Gender data	Ratio of boys to girls engaged in child labor force (excluding domestic work) is 3:2. When full-time domestic work is included, there is no difference in gender ratio.	ILO databases, Ashagrie 1997a
Rural data	90% of rural working children are engaged in agriculture	Ashagrie 1997a
Working conditions	Approximately 100 million children globally work under hazardous conditions. Children who work illegally are often exposed to hazardous conditions and account for >2/3 of all childhood work-related injuries.	NGO data quoted in Lemen et al 1993; Landrigan & Belville 1993.

Notes

* participation rates are calculated as a percentage of all children in a specific age-category that are working.

** lower limit based on World Bank estimate; upper limit based on ILO estimates.

*** lower limit provided by the government; upper limit based on NGO estimates.

Data on the extent of child labor and the associated burden of injury and disability are often of poorest quality in those countries with the highest number of working children. Definitional issues, resource constraints and attempts to hide illegal child labor (Parker 1997) also hamper data collection.

In some countries, surveillance data can be supplemented with Worker's Compensation and Occupational Health and Safety (OHAS) reports, however these sources are frequently not complete and not truthful (Lerer and Myers 1994). Aside from these limitations, official work-related injury documents, such as OHAS and Worker's Compensation report, rarely focus on child labor injuries (Pollack, Landrigan & Mallin 1990; Cooper and Rothstein 1995). We believe that because of the incompleteness of these reports, published epidemiology studies of childhood injury underestimates the importance of work as a causal or contributory factor. Although many children in the USA under the age of 16 work, employment data on this group is

not routinely collected (CDC 1996). As a rule, industrialized countries, like the US, have little or no information about the incidence of injury amongst seasonal child-workers.

II. Quantifying the Burden of Mortality, Nonfatal Injury and Disease Caused by Child Labor

The World Health Organization (1987); Landrigan et al. (1995) and Forastieri (1997) have reviewed injuries and diseases attributable to child labor. The most important determinant of the incidence of injuries and illness is the type of child labor. In developing countries, where children often work under hazardous conditions in the manufacturing and agricultural sectors, crushing, amputations and fractures account for up to 10% of all work-related injuries (Ashagrie 1997a). In the US, where over 2/3 of working children work in the service sector (food establishments, grocery and other stores), injuries are generally less common and less severe. **Box 2** provides a summary of some identified injury categories and time off work taken by injured children. It is difficult to compare US and developing world data, due to the use of different injury categories and because children in poorer countries are often unable to take off time to recover from injuries.

Box 2: Types of injuries and time off work in the US and in developing countries

Country	Main injury categories	Source
US	Sprains: 18-31%, cuts and lacerations: 13 -34%, burns: 8%, fractures: 3-5%	CDC 1996; Miller & Kaufman 1998
Developing countries	Falls: 21%, overexertion: 17%, striking against objects: 10%, burns: 9%, struck by falling objects: 7%, cuts: 6%	Ashagrie 1997a
Work days lost due to injury		
US	Median loss - 3 days (24% losing 1 day and 8% losing >31 days)	CDC 1996
Developing Countries	46% continue working despite a work-related injury or illness. 3% forced to stop working permanently.	Ashagrie 1997a

Working children are not only affected by physical injury , but they are also vulnerable to workplace toxins and to chemical hazards. This is because of:

- their relatively small size. Their total exposure to toxins can be loner, and their immature metabolic pathways which are often incapable of neutralizing dangerous chemicals,
- chemicals, such as solvents, that can disrupt developmental processes in the brain,
- and the fact that children exposed to hazardous substances have potentially more years of life left to develop long-term sequelae, especially if exposure continues into adulthood and the cumulative dose is high (Landrigan et al. 1998).

It is not the purpose of this document to provide a comprehensive catalog of disease, injury and social impacts of child labor, however, some important issues concerning the disease, injury, and are summarized in **Box 3**.

Box 3: Health impacts of child labor stratified by industry sector

SECTOR INDUSTRY	CATEGORIES OF CHILD LABOR	HAZARD	INJURY/DISEASE	DISTRIBUTION OF INJURY (SOURCE)
MANUFACTURING				
Clothing	Garment-making, button-making	Solvents, machinery, poor ergonomic design, emissions, noise	Trauma *, repetitive strain injuries, deformities, occupational lung diseases **, cancers, skin conditions	About 9% of children sustain some form of injury or illness (Ashagrie 1997a)
Iron and Steel, metalwork	Welding, soldering, plating	Emissions, machinery, heavy metals, radiation, noise	Trauma, occupational lung diseases, cancers, neurological impairment	
Glass and ceramics	Cutting, drawing and carrying molten glass, glazing and firing ceramics	Dangerous machinery, hot kilns, fires, dust and chemicals, lead exposure	Trauma, poisoning, occupational lung diseases, heat stress, cataracts	
Leather, tanning and footwear	Cutting, hammering, trimming, dyeing, stitching	Dangerous machinery, noise, exposure to chemicals and solvents, fire risk, sharp instruments,	Trauma ,communicable diseases, occupational lung diseases, chemical poisoning, repetitive strain conditions, cancers	
Chemicals	Matchstick and firework making, grinding and mixing chemicals	Explosions, fires, emissions, hazardous chemicals, gases	Trauma, burns, occupational lung diseases, poisonings, neurological impairment	
Food processing	Slaughtering, cutting carcasses, cleaning, separating animal parts	Dangerous machinery, unsanitary conditions, liquid and solid waste exposure	Trauma, infectious diseases, occupational lung diseases, repetitive strain conditions, deformities	
Textiles and weaving	Spinning, weaving, knitting, trimming, finishing, dyeing, washing	Dangerous machinery, noise, dusts and chemicals, poor lighting, fire risk, high temperatures	Trauma, deformities, repetitive strain injuries, hearing loss, burns, chemical poisoning, fatigue	
Mining and quarrying, stone and gem processing	Extraction of mineral products, carrying heavy weights, polishing slate and other minerals, gem polishing, stone carving	Emissions, dusts, dangerous machinery, explosions, fires, heavy metals, radiation, noise	Trauma, falls, drowning, occupational lung diseases, deformities, repetitive strain disorders, dermatitis, eye conditions	About 16% of children sustain some form of injury or illness (Ashagrie 1997a) Elevated urine mercury levels in children washing gold in Ecuador (Harari et al. 1997)

SERVICES				
Food	Preparing and handling food, stocking, cleaning, selling	Dangerous machinery, high temperatures, unsafe ladders, high shelving, fork-lifts, dangerous chemicals and cleaning solvents, long-hours, dangerous neighborhoods	Trauma, repetitive strain injuries, poisoning, communicable diseases, violence, stress and social alienation	About 8% of children sustain some form of injury or illness (Ashagrie 1997a)‖
Transportation	Driving, carrying goods, gas-station work, stevedore work	Dangerous machinery, fatiguing conditions, short deadlines, benzene exposure, exhaust emissions	Trauma, poisonings, neurological impairment,	About 18% of children sustain some form of injury or illness (Ashagrie 1997a)
CONSTRUCTION				
Building and brickmaking	Carrying heavy weights, digging, quarrying, working on high structures	Unsafe, high structures, dusts, chemicals, lead exposure, falling objects	Trauma, occupational lung diseases, falls, burns, poisoning	About 26% of children sustain some form of injury or illness (Ashagrie 1997a)‖
AGRICULTURE				
Farming	General farm work and care of animals, processing agricultural products	Dangerous machinery, unsafe transportation, unsafe structures, pesticides, chemicals, long working hours, heavy loads	Trauma, repetitive strain conditions, deformities, occupational lung diseases, parasitic and other infectious diseases, dermatitis, chemical and pesticide poisoning	About 12% of children sustain some form of injury or illness. This sector accounts for >2/3 of all injury across all sectors (Ashagrie 1997a)
Fishing	Land and sea based fishing, diving, marine product processing	Dangerous machinery, unsafe vessels, unsanitary conditions, dangerous currents	Trauma, hypoxic conditions, communicable diseases	
HOUSEHOLD WORK				
	Cooking, child-care, agriculture, domestic work, home-based manufacture	Exposure to fires and toxic fumes, dangerous solvents, poor working conditions, fatiguing conditions, physical and sexual abuse, malnutrition, social isolation	Trauma, respiratory conditions, HIV and sexually transmitted diseases, chemical poisoning, psychological impacts	
SEX WORK				
	Bar and club work, prostitution	Dangerous environments, drugs, physical abuse, rape, long-hours	Trauma, fatigue, communicable diseases including HIV and STD's, psychological impacts	
"INFORMAL WORK"				
	Scavenging, begging, hawking, drug selling, stealing	Unsanitary conditions especially on garbage heaps, exposure to violence and traffic accidents, legal sanction	Trauma, malnutrition, communicable disease, psychological impacts	Evidence of elevated body lead levels in "street-children"

Notes (Box 3)

* Trauma: incised wounds, lacerations, abrasions, crush injuries, traumatic amputations, falls, blunt and sharp force injuries, head and spine injuries. These injuries may require minor to extensive treatment and may result in varying degrees of disability or death.

** Occupational Lung Diseases: Include asbestosis, respirable- fiber related conditions, silicosis, bacterial, fungal , amoebic particles, particles of vegetable and animal origin, particles from organic and inorganic chemicals and synthetic materials (see Kilburn 1998)

Sources: Based on Satterthwaite 1996, WHO 1997, Forastieri 1998.

II.1. Categories of Hazardous Child Labor

II.1.a. Agriculture

Agriculture has high rates of occupational injury and a disproportionately high number of children are killed and severely injured on farms (Wilk 1993).

Reasons for these high injury and illness rates on farms include the role of poverty due to the rural-urban divide, lower school attendance, less emphasis on worker rights, limited access for OHAS surveillance and exposure to hazardous materials, such as pesticides (U.S. Department of Labor 1995). In addition, poor children working on farms are also exposed to bad housing, limited access to water and sanitation, and often have unsafe transportation (Wilk 1993). In developing countries, children on farms as well as amongst migrant laborers in high-income countries, are exposed to chemical agents, pesticides and herbicides. The health consequences of childhood exposure to agricultural chemicals may be underestimated (Reigart 1995). Africa's high prevalence of child agricultural labor has deleterious impacts on educational opportunities and long term development (ILO, 1996).

II.1.b. Manufacturing

In some Asian countries, children are being exploited in dangerous industries such as mining, glass smelting and metal recycling. Children are exposed to a variety of toxic agents such as mercury during gold washing (Harari, Forastiere & Axelson 1997). In industrialized countries, children of illegal immigrants in large metropolitan areas can be employed in sweatshops working in cramped and dangerous conditions (Postol 1993).

II.1.c. Household Services

The social status of the "girl-child", especially on the Indian sub-continent and Sub-Saharan Africa (SSA) dooms many children to a life of domestic servitude (Spivak 1988). Work, in and around the house includes food preparation, cleaning and washing and small-scale agriculture. The World Bank estimates that between 400 –700 million women and children are exposed to severe indoor air pollution, mostly from cooking fires (World Resources 1998/1999). Domestic work may result not only in health hazards but may also account for lost educational opportunities and increased vulnerability to poor nutrition as well as sexual and domestic violence (UNICEF 1997).

II.1.d. Forced and Bonded Labor

Children may be found in virtual slavery working under harsh, monotonous conditions. In the carpet weaving industry, ergonomic factors can result in permanent deformities (WHO 1987; UNICEF, 1997).

II.1.e. Sex Trade

This form of child exploitation is the subject of growing international interest (US Department of Labor 1996, UNICEF 1997). Poverty and lack of education coupled with demands of sexually repressive societies and sex tourism have resulted in increasing numbers of younger children becoming involved in commercial sex-work. The health implications, in light of the HIV epidemic, both from a medical and psychological aspect, are great.

II.1.f. Street Work

Begging, selling, scavenging and criminal activity have a wide variety of health risks (UNICEF 1997). Even seemingly safe occupations, such as shoe cleaning, can be dangerous for children due to exposure to toxic solvents (Harari, Forastiere & Axelson 1997).

II.1.g. Service Industries

As economies become more advanced, the service sector grows and more work opportunities for children and adolescents may become available in areas such as fast-food preparation, merchandizing, and distribution. The fast-food industry is the largest employer of young people in the United States. There has been an increase in work injuries associated with food preparation and transportation (Pollack, Landrigan and Mallino 1990; Kinney 1993, Belville et al. 1993). Although the health impacts of child labor in the service industry are substantial and often adverse (see **Box 4**), some benefits of adolescent work may accrue. These are discussed later in this study.

Box 4: Injuries and Heath Impacts – Young Workers in Service Industries

Injury	Causal factors
Cuts and lacerations	Lack of training, poor equipment
Slips and falls	Unsafe conditions, incorrect flooring
Electrical shocks, burns and cooking injuries	Non-compliance with building regulations, poor equipment
Motor vehicle accidents	Rush deliveries (pizza delivery deadlines)
Back injuries, lifting injuries	Poor ergonomic conditions
Exposure to solvents and hazardous chemicals	Non-compliance with health regulations
Non-accidental injury and homicide	Late-night work, dangerous locations
Psychological impacts	Non-compliance with child labor laws

Source: Based on Kinney (1993)

III. The Epidemiology of Child Labor

There is considerable debate on the accuracy of size estimates of the global child labor force. Current data has alerted international agencies and governments to the magnitude of the problem and make a strong case for urgent action. Knowing the number of children working throughout the world is a first step in identifying the "hidden epidemic" of work-related childhood injury and disease. **Table 1** is clearly an underestimate of the size of global child labor force. Nevertheless, it provides the first indication of the burden of injury, disability and death associated with child labor in the developing world. Although the paucity and accuracy of these data make it impossible to stratify the severity of injury and disability, nevertheless, over 6 million children are injured and about 32,000 killed each year. This is a profound source of concern.

These estimates of the incidence of injury and death are severely constrained by the quality of data pertaining to the number of working children and their type of work. It may be best to calculate a range of morbidity and mortality. In India (**Table 2**), the incidence of injury is influenced by the large proportion of children working in the agriculture sector. Eighty-five percent of working children is in agriculture, a sector with notoriously high injury rates. Even within a particular sector, injury rates may vary. For example, children engaged in machinery-intensive agriculture may be in greater danger than those involved in subsistence farming.

Table 1: Prevalence of Child Labor by Region: Estimates of Morbidity and Mortality

Region (a)	Working Children (a)	Total number of injuries (b)	Total number of disabled (c)	Total number of deaths (d)
Eastern Asia	22448000	2020320	808128	10102
Southern Asia	20143000	1812870	725148	9064
Eastern Africa	7965000	716850	286740	3584
Western Africa	5785000	520650	208260	2603
South East Asia	5587000	502830	201132	2514
South America	3485000	313650	125460	1568
Middle Africa	1848000	166320	66528	832
Western Asia	1109000	99810	39924	499
Central America	1022000	91980	36792	460
Northern Africa	982000	88380	35352	442
Caribbean	216000	19440	7776	97
Melanesia	147000	13230	5292	66
Southern Africa	100000	9000	3600	45
Southern Europe	84000	7560	3024	38
Eastern Europe	4000	360	144	2
Polynesia	1000	90	36	0.5
Northern Europe	1000	90	36	0.5
TOTAL	**70927000**	**6383430**	**2553372**	**31917**

Notes

(a) Regions and child labor force (10 –14 years) estimate from Fallon and Tzannatos 1998 – based on World Bank and ILO documentation estimating the size of the global child labor force in 1993.

(b) Total number of injuries (minor to fatal) estimated as the total number of working children X 0.09 (Ashagrie 1996a).

(c) Total number of disabled (short and long-term) estimated as the total number of injuries X 0.40 (Landrigan et al. 1998 – based on USA data).

(d) Total number of work related deaths estimated as the total number of injuries X 0.005 (Landrigan et al 1998).

III.1. Estimating the burden of disease due to child labor

Published reports on the outcome and long-term disability following injury are extremely limited for both adults and children (Murray and Lopez 1996b). One innovative approach to measure the burden of disease and injury due to exposures and risk factors, which was used in the Global Burden of Disease Study (GBDS) and 1993 World Development Report (World Bank 1993), is the disability adjusted life-year or DALY. The DALY reflects the total amount of healthy life lost due to *either* death or disability during the life span. The DALY has utility both for the measurement of the burden of disease and injury and for promoting efficient resource allocation through the identification of the best options for health interventions within a given budget (World Bank 1993; Murray and Lopez, 1996a).

Table 2: Estimating the Extent of Child Labor Related Injury, Disability and Death in India

Estimate (a)	Total child labor-force (b)	Children working in agriculture (c)	Children working in other sectors (d)	Total injuries-agriculture (e)	Total injuries other sectors (f)	Total number of disabled (g)	Total number of deaths (h)
Lower	18000000	15300000	2700000	1836000	189000	1036800	10125
Upper	72000000	61200000	10800000	7344000	756000	3240000	40500

Notes

(a) Lower bound estimate of the number of working children in India (1993) provided by official Indian Government reports. Upper bound from nongovernmental organization (NGO) data (see US Department of Labor 1994).

(b) Crude estimates of children <14 years working in all sectors in India in 1993.

(c) Based on an estimate that 85% of all children working in India are in the agricultural sector (US Department of Labor 1995).

(d) Total child labor force minus children working in agriculture.

(e) Based on an agricultural injury rate of 0.12 (Ashagrie 1996a).

(f) Based on a crude weighted rate of 0.07.

(g) Total number of disabled (short and long-term) estimated as the total number of all-sector injuries X 0.40 (Landrigan et al. 1998 – based on USA data).

(h) Total number of work related deaths estimated as the total number of all-sector injuries X 0.005 (Landrigan et al. 1998).

The GBDS estimates that over 1 million people (mostly men) died in 1990 due to occupational causes (injuries and dangerous exposures). Occupational causes are responsible for 2.7% of the total global DALYs (Murray and Lopez 1996b). The GBDS calculates occupational mortality using surveillance data from developed countries. Because of this, it most likely underestimates the total global mortality and disability (Murray & Lopez 1996b). In the GBDS, Leigh et al (1996) used data from Canada and Australia to estimate occupational mortality rates in countries without reporting systems. The calculation of the burden of disease attributable to a risk factor (such as occupation) is based on prevalence data for a particular exposure and the relative risk of injury or disease of the exposed versus the unexposed group (Murray and Lopez 1996b).

Although the GBDS provides a range of innovative options for the quantification of morbidity, mortality and long-term disability associated with child labor, regrettably little work has focused on this area. The current databases on child labor and health do not have sufficient or specific information that would permit such calculations[1]. The application of the GBDS injury data for calculating child labor DALYs is further limited by the lack of an "occupational category" as a specific external cause of injury (see Murray and Lopez 1996a, p210). Those countries with the highest prevalence of child labor are generally those that have the poorest OHAS surveillance systems.

More accurate national and regional estimations of the health impact of child labor using the global health statistics provided in the GBDS (Murray and Lopez 1996a), are constrained by the age stratification used[2] and lack of an occupation category in the injury tabulations. Taking these limitations into consideration, we have provided two estimates of work related injury and mortality rates using GBDS data (**Tables 3 & 4**).

---

[1] In the recommendations section of this study, we describe the data requirements for the application of the GBDS methodology and the DALY, in the study of child labor.

[2] The GBDS tables use the age-group categories; 0-4, 5-14, 15-44, 45-59 and 60+.

Table 3: Comparison of mortality rates for child and adult labor by GBDS region

REGION (a)	Total labor force (b)	Working children as a % of the total labor force (c)	Total occupational mortality (d)	Child mortality as a % of total occupational mortality (e)	Total mortality as a % of total labor force (f)	Child mortality as a % of child labor force (g)
EME	411728000	<0.02	154000	<0.1	0.04	0.05
FSE	174670000	<0.003	76200	<0.1	0.04	0.04
IND	411020000	5	185200	5	0.04	0.05
CHN	736325000	3	247100	4	0.03	0.05
OAI	303020000	2	148100	2	0.05	0.05
SSA	252449000	7	111800	6	0.04	0.04
LAC	200617000	2	97700	2	0.04	0.04
MEC	218282000	0.5	109200	0.4	0.05	0.04

Notes

(a) EME – Established Market Economies, FSE – Former Socialist Economies, IND – India, CHN - China, OAI – Other Asia and Islands, SSA – Sub-Saharan Africa, LAC – Latin American Countries, MEC – Middle Eastern Crescent. Regions are based on the Global Burden of Disease Study (Murray and Lopez 1996a, 19996b). For a list of the states and territories included in each region, see Annex 1.

(b) Global labor force per region – based on ILO estimates of country labor force size (ILO database 1997) and countries listed per region in the GBDS (Murray and Lopez 1996a).

(c) Child labor force (10 –14 years) for each GBDS region estimated from Fallon and Tzannatos 1998 – based on World Bank and ILO documentation – 1993 estimates.

(d) All-age occupational mortality from GBDS (Murray and Lopez 1996b) – Table 6.8, p313.

(e) Based on regional estimates of mortality using World Bank child (10-14 years) labor force participation rates (Fallon and Tzannatos 1998).

(f) See notes b and d for data sources.

(g) See notes c and e for data sources.

Due to incompatibility between the GBDS and World Bank geographical regions, **Table 3** contains the lower bound of an estimate of the number of working children in the poorest regions of the world. In all regions, the occupational mortality rate amongst children matches the adult occupational mortality rate indicating that children may be working in equally or even more hazardous conditions than adults. It is not possible to estimate child labor injury rates for most regions, however, recent data form the USA reveals that the injury rate of working adolescents exceeds that of working adults (Miller and Kaufman 1998).

Table 4 which is based on burn injury estimates from the GBDS shows that work-related burns constituted more than 1/3 of all burn injuries sustained in the 5–14 year age category. This may be a substantial underestimate, since it does not fully take into account burns sustained during housework, especially cooking over an open fire. The gravity of the problem illustrated by the fact that the burn-rate for working children is double the rate for all ages (684/100 000 versus 339/100 000).

Table 4: Childhood work-related burns in India

	Burns	
	All-causes (a)	Occupational (b)
Total Incidence	951000	301070
Rate/100 000	339	684
% of all burns		32

Notes

(a) Based on Murray and Lopez (1996a) – Burns (<20% - long duration – males and females 5 –14 years) (Table 235c)

(b) Based on an estimate of 44 million working children (5 –14 years), 5060000 injuries, of which 7% (354200) were burns and 85% (301070) of these burns were <20% in extent.

IV. Economic Approaches To The Health Impacts Of Child Labor

Work-related injuries and illnesses contribute substantially to health related costs in industrialized countries (Leigh et al 1998). As expected, there are little data on the economic aspects of adult occupational injury and disease in the developing world and essentially, the health and social costs of child labor have been ignored. This is unfortunate as valuation of the ill health caused by child labor permits a quantification of the problem, provides a macro-economic context, and facilitates informed debate on the best avenues for intervention. Economic valuation of morbidity, disability and mortality is fraught with difficulty because ethical and sociopolitical value judgements must be made. Cost considerations have, however, been important catalysts in setting environmental health standards in countries such as the US (Van Houtven & Cropper 1996). When measuring the health costs of child labor, one has to consider the following:

1. Direct health costs of work-related injury and illness borne by the public health sector as well as by the victim's families in the absence of health insurance or worker's compensation,
2. Lost productivity due to the inability to work or having to work at a reduced level,
3. Costs of pain and suffering and loss of opportunities to engage in other activities due to the injury or illness,
4. Expenses associated with creating a safer working environment, and
5. Changes in mortality risk rates (Cropper and Freeman 1991).

Regional and industry characteristics profoundly influence these considerations. A child working in an Indian glass factory will have no access to OHAS facilities and may be forced to continue working even after sustaining an injury. Such a child is paid a pittance and has little opportunity to engage in any other occupation or pursue an education. The factory owner has little fear of legal sanction and no inducement to create a safer working environment. Industrialized world risk estimations must be applied with extreme caution in this context. Even with these constraints, it is possible to used tested cost methodologies in the occupational health arena to estimate the health costs of child labor. The three essential steps in this economic assessment are:

1. determine morbidity and mortality rates for specific categories of child labor,
2. determine the population at-risk in specific countries or regions to predict the number of cases, and
3. derive some monetary value for the health impacts.

Because there is little data on child labor and few long-term follow-up studies, it is difficult to estimate mortality and morbidity rates using the dose-response or damage function applied in environmental economics. We have already discussed the problems in determining the number of working children in regions and countries. In order to derive some monetary value for the health impact of child labor, we need to multiply the number of cases of death and injury by the value of each case. The value per case can be calculated using either the human capital (HC) or the willingness to pay (WTP) approach.

The HC approach uses an individual's discounted lifetime earnings as a measure of that individual's "value". HC is based on two assumptions, namely that the individual "is what he or she produces" and that productivity is accurately measured by earnings (Cropper & Freeman 1991). Measuring the loss in net output due to premature death and illness has been criticized as placing too a low value on the lives of children, the socially disadvantaged, the elderly and the disabled. The HC approach yields only the lowest boundary of the value of a statistical life. In 1991, the average annual wage of a manufacturing worker in Delhi was $500. Using the HC approach, this would give a value of a statistical life as $10 000, implying aggregate benefits of around $10 000 (Cropper et al. 1997). HC estimates should be viewed in the context of the average number of life-years lost per individual in countries where life-expectancy is curtailed.

It is also important to consider the utility of a cost of illness approach. This measures the health costs of child labor as direct expenditure plus the social cost of lost earnings. Cost of illness is best derived from assessments of the value of lost work-time (earnings foregone) added to the value of medical expenditures due to an injury or illness. For a child working in hazardous conditions, it is difficult to attach a monetary value to a work-related injury. Options for avoiding exposure to the dangers of the workplace may be limited, or the child may be forced to continue working. In addition, earnings data for child labor is difficult to obtain, especially for countries where bonded labor and minimal remuneration predominate.

WTP is a commonly used for valuing environmental impacts in industrialized countries. It allows researchers and policy-makers to measure the value of life and health in the marketplace by measuring how much individuals are willing to pay to achieve reduction of the probability of mortality or morbidity (Cropper & Oates 1992). For child labor, the WTP approach is complicated by the need to attach a "risk premium" for occupational mortality and the impact of age and latency (the length of time between exposure and an adverse health outcome). Using data from the Indian manufacturing industry, Cropper et al. (1997) estimate that the value of a statistical life was between $60,000 – $90,000. Taking into consideration differences in the Gross Domestic Product (GDP) in India and in the US, we believe that this estimate is reasonable since it compares with an Environmental Protection Agency (EPA) estimate of a US statistical life of $4,800,000.

Extreme caution is required when valuing the health impacts of child labor. For a child or adolescent whose earning ability will be deferred for a number of years, the value of a life can not be truly represented through the "earnings foregone" approach (Convery 1995). Merely

regarding children as potential units of production is filled with ethical problems[3]. In addition, there are no simple explanations behind the demand and supply of child labor. Children are generally paid reduced wages, but there is little evidence that replacing children with older workers will make industries in developing countries less competitive (U.S. Department of Labor 1994). The advantages of employing children may include their suitability for certain tasks (nimble, small fingers for carpet weaving), higher levels of motivation for menial work, and general obedience under difficult working conditions. The link between poverty and the supply of child labor is controversial. Working children generally generate only a small proportion of household income and are invariably taught skills which do not contribute to their advancement into better paid jobs. Child labor is invariably part of a cycle of intergenerational poverty, injury, disease and poor educational opportunities.

IV.1. Examples of the application of economic valuation methods in estimating the health impacts of child labor

Depending on the estimate of mortality and the valuation methods used, the total annual cost of child labor related mortality in India lies between 101 million and 2.43 billion dollars (**Table 5**). As a percentage of GDP (range 0.19 – 0.75), this amount is substantial and makes a strong ethical case for urgent intervention.

The health impact valuation exercise for child labor in the South African agricultural sector demonstrates the use of a value of a statistical life (VSL) approach to mortality combined with a cost of non-fatal injury estimate (**Table 6**). The value of mortality and the direct health costs of non-fatal injury are large part of the total economic impact of child injury in this sector. However, better data is required for a complete cost estimate (which includes the costs of suffering, productivity loss and other expenditures).

Table 5: Valuation of mortality due to child labor in India

Estimate (a)	Total number of deaths (b)	VSL Valuation: HC approach US dollars (c)	VSL Valuation: WTP approach US dollars (d)	Total cost of mortality (% of GDP) (e)
Lower	10125	101250000	607500000	0.19
Upper	40500	405000000	2430000000	0.75

Notes

(a) Lower bound estimate of the number of working children in India (1993) provided by official Indian Government reports. Upper bound from NGO data (see US Department of Labor 1994).

(b) Total deaths taken from Table 2

(c) Value of Statistical Life (VSL) -Human Capital (HC) approach, based on $10 000 per life (see Cropper et al 1997).

(d) Value of Statistical Life (VSL) - Willingness to Pay (WTP) approach, based on $60 000 per life (see Cropper et al 1997).

(e) GDP estimate ($324,082,000,000) from World Resources (1998).

[3] For the purposes of this study, the statistical value of a working child's life is regarded as similar to that of an adult in the same country. The plausibility of this valuation is supported by the low adult wage rates in countries with high levels of child labor. From an ethical standpoint, it seems reasonable to assume that the value of the life of a child doing an adult's work (or even working at all) should be equivalent to that of an adult.

Table 6: Valuation of mortality and injury due to child labor in the South African agricultural sector

Number of working children (a)	60000
Number of injuries (b)	7200
Number of disabling injuries (c)	2880
Number of deaths (d)	14
VSL Valuation: HC approach (US dollars) (e)	$1,302,000
VSL Valuation: WTP approach (US dollars) (f)	$7,868,000
Costs of injury (US dollars) (g)	
Minor	$776,088
Moderate	$301,812
Severe	$1,086,523
Total direct health costs (US dollars)	$2,164,423
Total costs (death and injury – US dollars)	$10,032,423

Notes

(a) Number of children (8-14 years) employed as laborers on South African farms taken from US Department of Labor 1995, quoting ILO data.

(b) Annual number of injuries, based on an agricultural injury rate of 0.12 (Ashagrie 1996a).

(c) Number of disabling injuries (short and long-term) estimated as the total number of agricultural injuries X 0.40 (see Landrigan et al. 1998 – based on USA data).

(d) Estimated as the total number of agricultural injuries X 0.005 (Landrigan et al. 1998).

(e) Value of Statistical Life (VSL) -Human Capital (HC) approach, based on $93 000 per life. Calculated using a per-capita GDP weighted ratio of the estimate for VSL (see Cropper et al 1997).

(f) Value of Statistical Life (VSL) - Willingness to Pay (WTP) approach, based on $562,600 per life. Calculated using a per-capita GDP weighted ratio of the US EPA estimate of VSL (see Cropper et al 1997).

(g) Direct health sector costs of injury (hospitalization, treatment, pharmaceuticals)– public sector only. Distribution of injury severity based on data from the Rural Injury Surveillance Study (RISS) conducted by the Trauma Research Unit of the South African Medical Research Council (0.9 – minor, 0.07 – moderate, 0.03 – severe). Health sector costs per case based on Lerer and Matzopoulos 1995 ($120 – minor, $600 – moderate, $5040 –severe). Exchange rate: $1 = ZAR 5.

(h) Sum of the mortality (VSL – WTP approach) and direct health costs

V. Child Labor And Health – Some Issues And Trends

V.1. Globalization and economic transition

The world is experiencing a profound change in the nature and organization of work in the face of a changing global economy, rapid shifts of capital and manufacturing capacity and new technologies (Hurrell 1998). Globalization has brought with it a range of public health challenges in areas including trade, travel, migration, food security, environmental degradation and communications (Yach and Bettcher 1998; World Resources 1998). Changes in the world economic order affect child labor, especially in areas such as manufacturing and the export sector. The economic well being of a country influences the distribution of child labor, the extent of OHAS, and child labor legislation enforcement. Poorer countries cannot afford inspection, treatment and rehabilitation services, especially in newly established free trade zones or "maquiladoras" which often employ young women and children under hazardous conditions (Abbot 1997)

The movement of manufacturing facilities to regions and countries with limited OHAS and environmental regulation and enforcement has been criticized as a form of "environmental racism" (Northridge and Shepard 1997). Several large corporations have been identified as having production facilities with underage workers, unsafe working conditions, dangerous solvents and poor indoor air quality. Children (and most adults) working under these conditions are invariably remunerated at levels well below those required to maintain an adequate living standard (Cushman 1998). The financial crisis that struck East Asia in 1997 has resulted in the collapse of currencies and pressures for substantial structural change in many economies. In the short term, the reduction in export-based manufacturing activity may result in some decrease in child labor, it is important to look to long term institutional, social and regulatory reforms to protect children. The East Asian crisis demonstrates the need for a sound OHAS policy, human and environmental resource management as developing countries are often not in a position to derive sustainable benefits from global capital flows and volatile markets (World Bank 1997d; World Bank 1998a).

V.2. Technology

The nature of work in the late 20th century has been profoundly influenced by technology. New patterns of factory organization, facilitated by advanced technology, may require workers to carry out intense, repetitive tasks over long and irregular periods (Walker 1998). Children in production facilities are often forced to do monotonous work and can sustain repetitive strain injuries and deformities. Increasing electrification in Sub-Saharan Africa, while resulting in substantial health and social benefits, exposes working children to dangerous machinery (Lerer and Yach 1996). Technological "leapfrogging" to automated manufacturing can reduce the quantity of child labor needed in poorer countries. This process is analogous to steps designed to ensure that poorer countries do not become sites for polluting and toxic waste producing industries[4].

V.3. Environmental Hazards and Pollution

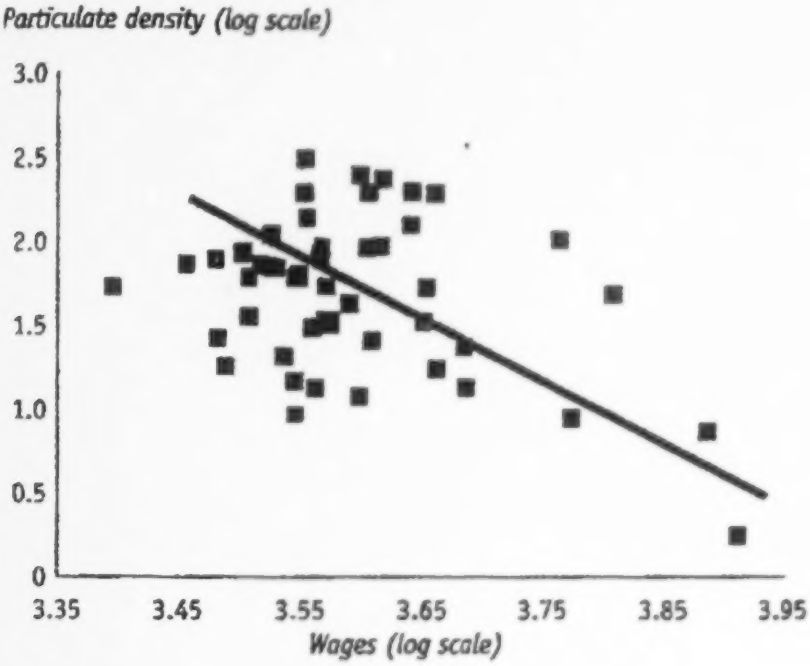
Trade liberalization can cause substantial increases in pollution, especially when manufacturing relies on cheap energy (Beghin et al. 1998). Governments, eager to promote industrial development, may have lenient pollution regulations and - even when more stringent standards are in place - may not have the will or capacity to enforce regulations (Chen & Huang 1997). Industrial areas with unskilled and child workers generally have higher levels of pollution than advanced production facilities. Environmental regulations are stricter and better enforced in rich areas. Affluent, educated communities are better equipped to fight polluting industries. Data from China shows an association between low wages and particulate pollution (**Figure 1**). Working children, who are paid at the lower end of the wage scale, are at higher risk for respiratory infections and long-term morbidity.

---

[4] There is little evidence that globalization has resulted in the movement of heavy "dirty" manufacturing from rich to poorer countries (Beghin and Potier 1997).

Children can be exposed to lead both at work (such as stripping car batteries or grinding lead for paint) and from living in close proximity to high vehicular traffic densities. Children in both polluted and non-polluted areas in China have blood lead levels in excess of the US standard (10 micrograms per deciliter) and adverse neurobehavioral, intelligence and growth impacts (World Bank 1997a). Reducing blood levels has a substantial benefit to society (Schwartz, 1993)

Figure 1: Wages and Particulate Pollution in China



Source: World Bank 1997a: p13

V.4. Violence and high-risk behaviors

Violence, including homicide or assault by a fellow worker or robber, is a recognized workplace hazard for adults and children (Castillo & Malit 1997). Children working in restaurants and bars may be exposed to sexual harassment and violence. Children living on the street are often forced to engage in criminal activities increasing their-risk for injury. Work may expose children to a physical and social environment conducive to substance abuse and high-risk sexual behavior.

VI Health Impacts Of Child Labor On Economic And Social Development

VI.1. Child labor and social capital

Social capital is defined as the features of society, such as civic participation, reciprocity, trust and community development, that promote harmony and cooperation for mutual benefit (Kawachi et al. 1997). Child labor, in most cases, is part of an erosion of social capital in poor countries. It is symptomatic of a lack of the basic resources to nurture a most important asset – the young. Communities that suffer sustained economic hardship, the very condition under

which child labor is most prevalent, have poorer health, psychological and cognitive functioning (Lynch, Kaplan and Shema 1997). Developing countries face the challenge of translating their endowment in natural and human resources into sustainable development and the long-term wellbeing of their populations. Investing in education and the creation of safe, healthy environment for young people ensures that countries save some of their current wealth for future generations (World Bank 1997b).

VI.2. Women, children and work

Social, cultural and historical factors determine the sex segregation of occupations (Anker 1998). Girls are often forced into domestic service, which undermines their educational opportunities and future role in the labor force.

A growing number of women in the work force has been a consistent feature of advanced societies. Occupational segregation by sex may hamper economic growth (The Economist 1998; Anker 1998). The health aspects of work for girls of a reproductive age need to be considered as early return to full time work has been found to limit the initiation and duration of breast feeding in developed countries (Fein & Roe 1998). The negative effects of malnutrition have almost fully manifested by 24 months of age, underlining the importance of having early childhood programs for children of working mothers (World Bank 1997c). Poorer countries must recognize the interactions between child labor, malnutrition, breast feeding, and child health. This will help them harness resources required to ensure that early childhood development is a national priority.

VI.3. Child labor, education and health

Child labor limits the opportunities for obtaining an education, and female educational attainment is a recognized determinant of child survival and health (Raju 1989, Parker 1997). Denying girls an education not only endangers the health of future generations, but also reduces benefits of education mediated through reduced fertility and improved household incomes. Africa has experienced a decline in the number of girls between the ages of 6 and 11 attending school. Without policy changes by2015 more than half of all girls in this age category will not be attending school on a regular basis (World Bank 1995). Econometric analysis in Thailand has shown that children drop out of school, not necessarily to enter the labor force, but rather due to the high costs of schooling (Tzannatos 1996). Ensuring cheaper and easier access to schooling not only has a direct health benefit, but also reduces child labor rates.

VI.4. The benefits of work for teenagers

The line dividing productive youth employment and exploitative child labor is often subtle (Davis 1998). In some industrialized countries, part-time work for teenagers has been extolled as a means of teaching the work ethic and introducing young people to virtues of a productive life. In poorer countries, children over 14 years may be forced to leave school and seek work to support their families and provide money to ensure that younger siblings at least have some schooling. High unemployment and economic stagnation have deleteriously influenced the labor

market for teenagers in many developing countries. Young work-seekers in Asia and Africa are often forced to accept the most menial and dangerous jobs or remain unemployed.

In countries such as the US, about 60% of high school seniors report working an average of 3.1 hours per day. There is growing concern as to the whether the benefits of work outweigh the negative health and social impacts (Thomas, 1998; Zakocs et al. 1998). We have already highlighted the injury risks associated with work in the service sector, and in particular hazards such as violence. The impact of part-time work on academic performance and quality of life must also be considered since working children may be at increased risk for psychological problems and alcohol and drug abuse (Greenberger & Steinberg 1986). Adolescent labor, even in the service sector, may reflect a harsh world for children from poorer families, where real wages for entry-level positions are low, benefits are few and prospects for advancement limited (Finnegan 1998). As shown in **Box 5**, a quarter of teenagers working part-time in Massachusetts, US, do so to help support their families or themselves.

Box 5: Reasons why 301 Massachusetts teenagers surveyed from 1994 – 1997 worked part-time

Reason	Percentage of total (a)
To make spending money	75%
To buy something expensive	50
To save for future schooling	33
Helping to support the family	23
Supporting themselves	2

Notes
(a)Respondents could answer positively to more that one question.
Source: Occupational Health surveillance Program, Massachusetts Department of Health, as quoted in Thomas (1998).

VII. Exploring Effective Avenues For Intervention

VII.1. Reducing the supply of child labor

The 1997 *State of the World's Children* (UNICEF 1997) emphasizes that child labor need not be an inevitable consequence of poverty in the less-developed world. Initial research conducted by the World Bank has demonstrated that children may be forced to work because of the lack of educational opportunities and societal forces that make child labor attractive (Fallon and Tzannatos 1998). The alleviation of severe poverty, women's development and empowerment, and a child development focus will assist in raising the age at which children start work. Special subsidies are required to ensure that poor households can afford to send children to school; thereby reducing the opportunity cost of child labor (Tzannatos 1996)

VII.2. Reducing the demand for child labor

Since export industries account for a tiny proportion of child labor, it is incorrect to solely attribute child labor in developing countries to the inequitable distribution of global

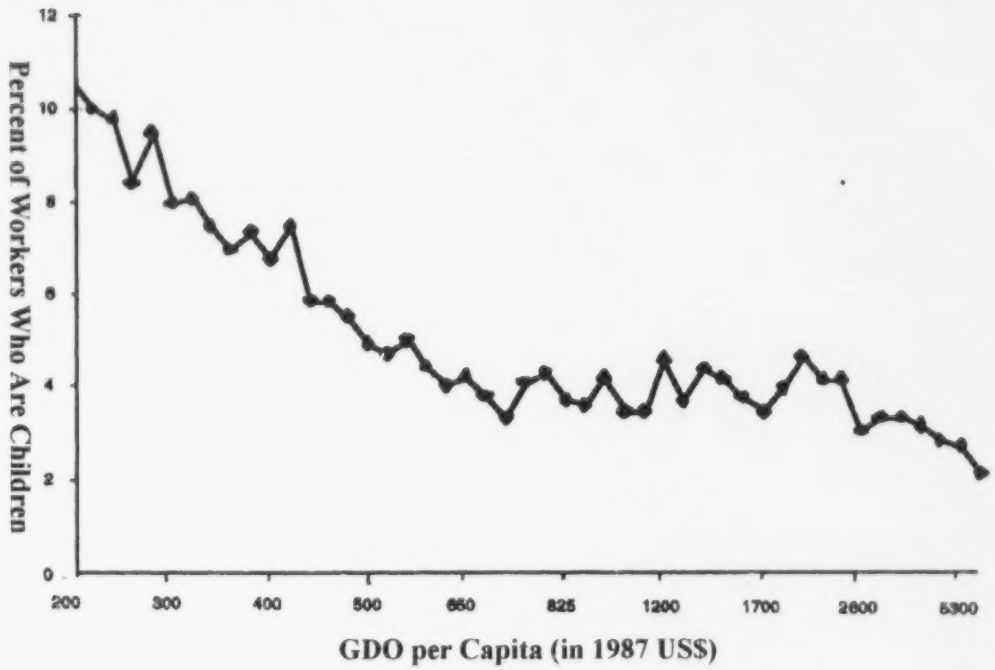
consumption[5] (Scanlon 1998; UNICEF 1997). Nevertheless, the global economy largely determines the economic wellbeing of poorer countries through exchange rates, imports, technology and capital transfers and economic adjustment. Economic growth and the structure of production influence child labor rate and as GDP per capita increases, the number of working children decreases (**Figure 2**).

There is considerable debate about what are the best ways to reduce the demand for child labor. The imposition of labor standards through international trade policy, such as the use of tariffs and sanctions, may harm a fragile export sector in a developing country, resulting increased poverty (Maskus 1997). The best approach seems to be through measures aimed at raising household income among the ultra-poor and subsidizing education.

VII.3. Ensuring the best possible health outcomes for working children

Recent trends have resulted in a deterioration in working conditions in many industries due to the precariousness of employment, the fragmentation of production, and the effects of a client-oriented economy (Walker 1998). It is unlikely that economic and social circumstances will, in the short-term at least, rise enough to substantially reduce child labor rates in the poorer regions of the world. Subsequently, innovative interventions are required to protect working children.

Figure 2: The relationship between child labor and GDP per capita



Source: Fallon and Tzannatos 1998

[5] A small number of industrialized nations are responsible for over 80% of the world's consumption of goods and services (UNDP 1998).

The World Bank , ILO, UNICEF and various NGO's are collaborating to promote awareness and focus on the most hazardous and degrading child labor practices, such as slavery, work in heavy industry, and sexual exploitation. Various international conventions[6] exist for the protection of children, but compliance is patchy, especially in those regions with the highest prevalence of child labor. The particular occupational health care needs of children are invariably ignored, as OHAS services and enforcement are generally limited in those countries and hazardous industries where child labor predominates. Improving surveillance and data collection on the health status of child workers, is the first step to improving occupational health services, and is discussed in the next section of this study.

VIII. Priorities For Further Research On Child Labor

VIII.1. Improving the quality of data on child labor

In order to move the debate on reducing child labor forward, better data is required on the health, social impacts of child labor. Similarly, a clearer understanding of the economics of child labor will assist in designing cost-effective avenues for intervention. The availability of standardized data sets, such as those used in the GBDS can help to provide a far clearer picture of the death, injury, disease and disability associated with child labor (World Bank 1993; Murray and Lopez 1996a, b). In this study, we have demonstrated the utility of applying available estimates across sectors and regions, but accurate "benchmark" data is urgently required, especially for dangerous industries and countries with large number of working children. Small-scale studies should focus on collecting health and economic data to facilitate quantification of the health costs of child labor (**Box 6**).

VIII.2. Improving the monitoring and surveillance of child labor

To accurately assess the incidence of injury and disease, long-term cohort studies of working children combined with surveillance data on injuries and toxic exposures are required (Forastieri 1997; Lemen, et al. 1993).

VIII.3. Research into the changing nature of the global economy, work and the workplace and its implications for child labor

This study has identified the link between globalization and child labor. As many countries with high child labor rates are facing economic turmoil, further studies are required to assess health impacts. The increasing size of the service sector will change the pattern of child work resulting in new hazards and risks. Technological advances and their influence on work also have to be considered. Even in advanced economies, the changing nature of work brings with it health and safety challenges (Walters 1998).

---

[6] These include the United Nations Convention on the Rights of the Child, ILO minimum working age convention (No. 138 of 1973) and ILO conventions on forced labor (No. 29 of 1930; No 105 of 1957).

VIII.4. Research into the social and institutional issues surrounding child labor

As the driving forces for the most oppressive forms of child labor lie in the social and cultural domain, qualitative research is required to develop intervention activities. Particular attention needs to be paid to renewing the agenda for improving the lives of children (Postol 1993).

Box 6: Minimum data requirements for research into the health impacts of child labor

Mortality and morbidity data
• Age and gender information on child exposure to work, stratified by industry and type of work. • Age and gender information on cause of death and injury stratified by various categories of child labor. • Age and gender information on the outcome of childhood work-related injuries and illnesses particularly; the proportion of an injury or disease that leads to a disabling outcome, the average age of disability onset, the duration of the disability and the severity of the disability (see Homedes 1996).
Economic data
• Industry-specific information on child-wages, benefits, and outputs of sufficient accuracy to permit the calculation of the present discounted earnings by age group. • Information on the cost of treatment and the social costs of injury, disability and mortality. • Country specific valuations of the upper and lower bounds of monetary value of human life and the economic impact of disability and injury.

VIII.5. Seeking innovative solutions, assessing interventions and searching for success stories

Small-scale studies can be used to test interventions. Such studies can also be used for assessing the effectiveness of specific strategies, such as prioritizing the protection of children from the most hazardous work activities (for a list of such activities, Forastieri 1997:460). As child labor results from an interaction of social and economic factors, examining projects that have either succeeded in the reduction of child labor or improved the health and educational prospects of working children can assist in clarifying "systemic" solutions which can be implemented across sectors.

ANNEX 1

States or territories included in the Global Burden of Disease Study, by region

Established market economies (EME))

Andorra
Australia
Austria
Belgium
Bermuda
Canada
Channel Islands
Denmark
Faeroe Islands
Finland
France
Germany
Gibraltar
Greece
Greenland
Holy See
Iceland
Ireland
Isle of Man
Italy
Japan
Liechtenstein
Luxembourg
Monaco
Netherlands
New Zealand
Norway
Portugal
San Marino
Spain
St. Pierre and Miquelon
Sweden
Switzerland
United Kingdom
United States

Formerly socialist economies of Europe (FSE)

Albania
Belarus
Bosnia and Herzegovina
Bulgaria
Croatia
Czech Republic
Estonia
Hungary
Latvia
Lithuania
Macedonia
Republic of
Moldova
Poland
Romania
Russian Federation
Slovakia
Slovenia
Ukraine
Yugoslavia

India (IND)
China (CHN)
Other Asia and islands (OAF

American Samoa
Bangladesh
Bhutan
Brunei Darussalam
Cambodia
Cook Islands
Federated States of Micronesia
Fiji
French Polynesia
Guam
Hong Kong
Indonesia
Johnston Island
Kiribati
Korea. Democratic People's Republic of
Korea Republic of
Lao People's Democratic Republic
Macao
Malaysia
Maldives
Marshall Islands
Mauritius
Midway Island
Mongolia
Myanmar
Nauru
Nepal
New Caledonia
Niue
Northern Mariana Islands
Palau
Papua New Guinea
Philippines
Pitcairn Island
Reunion
Seychelles
Singapore
Solomon Islands
Sri Lanka
Taiwan
Thailand
Tokelau Island
Tonga
Tuvalu
Vanuatu
Vietnam
Wake Island
Wallis and Futuna Islands
Western Samoa

Sub-Saharan Africa (SSA)

Angola
Ascension
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Central African Republic
Chad
Comoros
Congo
Cite d'Ivoire
Djibouti
Equatorial Guinea
Eritrea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritania
Mayone
Mozambique
Namibia
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Sierra Leone
Somalia
South Africa
St. Helena
Sudan
Swaziland
Tanzania
Togo
Tristan da Cunha
Uganda
Zaire
Zambia
Zimbabwe

Latin America and the Caribbean (LAC)

Anguilla
Antigua and Barbuda
Argentina
Aruba
Bahamas
Barbados
Belize
Bolivia
Brazil
British Virgin Islands
Cayman Islands
Chile
Colombia
Costa Rica
Cuba
Dominica
Dominican Republic
Ecuador
El Salvador
French Guiana
Grenada
Guadeloupe
Guatemala
Guyana
Haiti
Honduras
Jamaica
Martinique
Mexico
Montserrat
Netherlands Antilles
Nicaragua
Panama
Paraguay
Peru
Puerto Rico
St Kits and Nevis
St Lucia
St Vincent and the Grenadines
Suriname
Trinidad and Tobago
Turks and Caicos Islands
Uruguay
U.S. Virgin Islands
Venezuela

Middle Eastern Crescent (MEC)

Afghanistan
Algeria
Armenia
zerbaijan
Bahrain
Cyprus
Egypt
Former Spanish Sahara
Georgia
Iran. Islamic Republic of
Iraq
Israel
Jordan
Kazakhstan
Kuwait
Kyrgyzstan
Lebanon
Libyan Arab Jamahiriya
Malta
Morocco
Oman
Pakistan
Qatar
Saudi Arabia
Syrian Arab Republic
Tajikistan
Tunisia
Turkey
Turkmenistan
United Arab Emirates
Uzbekistan
West Bank and Gaza Strip
Yemen

References

Abbot J 1997 Export processing zones and the developing world. Contemporary Review 270: 232-238.

American Academy of Pediatrics (Committee on Environmental Health) 1995 The hazards of child labor. Pediatrics 95: 311-3113.

Anker R 1998 Gender and jobs: Sex segregation of occupations in the world. Geneva: International Labour Organization.

Ashagrie K 1997a Statistics on Working Children and Hazardous Child Labour in Brief. Geneva: International Labor Office. [http://www.ilo.org/public/english/child/documentation/trends/stats.htm.]

Ashagrie K 1997b Methodological Child Labour Surveys and Statistics ILO's Recent Work in Brief. Geneva: International Labour Office

Banco L, Lapidus G, Braddock M 1992 Work-related injury among Connecticut minors. Pediatrics 89:957-960.

Banerjee SR 1995 Child labor in India: present status [editorial]. Indian Pediatrics. 32:403- 408.

Beghin J, Bowland B, Dessus S, Roland-Holst D, van der Mensbrughhe D 1998 Trade, environment and public health in Chile. Evidence from an economywide model. Unpublished manuscript – available from The World Bank – EDI.

Beghin J, Potier M 1997 Effects of trade liberalisation on the environment in the manufacturing sector. The World Economy 20 (4): 435-456.

Belville R, Pollack SH, Godbold JH, Landrigan PJ 1993 Occupational injuries among working adolescents in New York State. Journal of the American Medical Association 269: 2754-2759.

Castillo DN, Malit BD 1997 Occupational injury deaths of 16 and 17 year olds in the US: trends and comparisons with older workers. Injury Prevention 3: 277-281.

CDC [Centers for Disease Control and Prevention] 1996 Work-related injuires and illnesses associated with child labor – United States, 1993. Journal of the American Medical Association 276:16-17.

Chen M, Huang C 1997 Industrial worker's health and environmental pollution under the new international division of labor: The Taiwan experience. American Journal of Public Health 87: 1223-1231.

Convery FJ 1995 Applying environmental economics in Africa. Washington DC: The World Bank.

Cooper SP, Rothstein MA 1995 Health hazards among working children in Texas. Southern Medical Journal 88: 550-554.

Cropper ML, Freeman AM 1991 Environmental Health Effects. In: Measuring the demand for environmental quality. Braden JB, Kolstad CD (Editors). Amsterdam: Elsevier Scientific Publishers.

Cropper ML, Oates WE 1992. Environmental Economics: A Survey. Journal of Economic Literature 30: 675 - 740

Cropper Ml, Simon N, Alberini A, Sharma PK 1997 The health effects of air pollution in Delhi, India. Policy Research Working Paper No. 1860. Washington DC: The World Bank.

Cushman JH 1998 Nike pledges to end child labor and apply U.S. rules abroad. The New York Times, May 13: C1.

Davis L 1998 Youth employment versus exploitative child labor [letter]. Public Health Reports 113: 3-4.

Economist 1998 For better or for worse – A survey of women and work. The Economist. July 18.

Fallon P, Tzannatos Z 1998 Child labor: Issues and directions for the World Bank. Washington DC: The World Bank.

Fein SB, Roe B 1998 The effect of work status on initiation and duration of breast-feeding. American Journal of Public Health 88: 1042-1046.

Finnegan W 1998 Cold new world: growing up in a harder country. New York: Random House.

Forastieri V 1997 Children at work: Health and safety risks. Geneva: International Labor Office.

Frumkin H, Williamson M, Magid D, Holmes JH, Grisso JA 1997 Occupational injuries in a poor inner-city neighborhood. American Journal of Industrial Medicine 45:1374-1382.

Greenberger E, Steinberg L 1986 When teenagers work: The psychological and social costs of adolescent employment. New York: Basic Books.

Harari R, Forastiere F, Axelson O 1997 Unacceptable "occupational" exposure to toxic agents among children in Ecuador. American Journal of Industrial medicine 32: 185-189.

Homedes N 1996 The Disability-Adjusted Life Year (DALY): Definition, measurement and potential use. Human Capital Development Working Paper 68, Washington DC: The World Bank.

Hurrel JJ 1998 Are you certain – Uncertainty, health and safety in contemporary work. American Journal of Public Health 88: 1012-1013.

ILO 1996 Child labour in commercial agriculture in Africa. Proceedings of a Technical Workshop on Child Labour in Commercial Agriculture in Africa. Dar es Salaam, United Republic of Tanzania, 27-30 August 1996.

International Conference on Child Labour 1997 Strategies for eliminating child labour: prevention, removal and rehabilitation – Synthesis document (Oslo, 27-30 October 1997). Geneva: International Labour Office. New York: United Nations Children's Fund.

Kawachi I, Kennedy BP, Lochner K, Prothrow-Stith D 1997 Social capital, income inequality, and mortality. American Journal of Public Health 87:1491-1498.

Kilburn KH 1998 Pulmonary response to gases and particles. In: Maxcy-Rosenau-Last Public Health and Preventative medicine. Wallace R [editor]. Stamford ,CT. Appleton & Lange: pp.577-591.

Kinney JA 1993 Health hazards to children in the service industries. American Journal of Industrial Medicine 24: 291-300.

Landrigan PJ, Belville R 1993 The dangers of illegal child labor. American Journal of Diseases of Childhood 147:1029-1030.

Landrigan PJ 1993 Child labor: a re-emergent threat [editorial]. American Journal of Industrial Medicine. 24 :267-268.

Landrigan PJ, Pollack SH. Belville R. Godbold JH 1995 Child labor. Pediatric Annals 24:657-662.

Landrigan PJ, Pollack SH, Belville R, Godbold J 1998 Health hazards of child labor. In: Maxcy-Rosenau-Last Public Health and Preventative medicine, Wallace R [editor]. Stamford ,CT, Appleton & Lange: pp.697-698.

Leigh JP et al 1996 Occupational Hazards. In Murray CJL, Lopez AD, editors. Quantifying global health risks: the burden of disease attributable to selected risk factors. Cambridge, Harvard University Press.

Leigh JP, Markowitz SB, Fahs M, Shin C, Landrigan PJ 1998 Occupational injury and illness in the United States. Estimates of costs, morbidity, and mortality. Archives of Internal Medicine 26: 195-197.

Lemen RA, Layne LA, Castillo DN, Lancashire JH 1993 Children at work: prevention of occupational injury and disease. American Journal of Industrial Medicine. 24: 325-330.

Lerer LB, Myers J 1994 The application of two documentary sources for the identification of fatal occupational injuries. American Journal of Industrial Medicine 26: 521-527.

Lerer LB, Matzopoulos R 1995 Meeting the challenge of rail-commuter safety: The Public Health approach. Health Consulting Office Technical Report. Cape Town: South African Medical Research Council

Lerer LB, Yach D 1996 Quantifying the health benefits of South Africa's accelerated national electrification programme. Journal of Comprehensive Health 7: 71-72.

Lynch JW, Kaplan GA, Shema SJ 1998 Cumulative impact of sustained economic hardship on physical, cognitive, psychological and social functioning. New England Journal of Medicine 337: 1889-1895.

Maskus K 1997 Should core labor standards be imposed through international trade policy? World Bank Development Research Group, Policy Research Working Paper 1817. Washington DC: The World Bank.

Miller ME, Kaufman JD 1998 Occupational injuries among adolescents in Washington State, 1988-1991. American Journal of Industrial Medicine 34: 121-132.

Murray CJL, Lopez A 1996a Global Health Statistics: A Compendium of Incidence, Prevalence and Mortality Estimates for over 2000 conditions. In: Global Burden of Disease Series. Published by the Harvard School of Public Health, on behalf of the World Health Organization and the World Bank.

Murray CJL, Lopez A (editors) 1996b The Global Burden of Disease: A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020. Published by the Harvard School of Public Health, on behalf of the World Health Organization and the World Bank.

Northridge ME, Shepard PM 1997 Environmental racism and public health
American Journal of Public Health 87:730-732.

Parker D 1997 Health effects of child labor. Lancet 350:1395-1396.

Postol T 1993 Public Health and working children in Twentieth-Century America: An historical overview. Journal of Public Health Policy. Autumn: 348-354.

Pollack SH, Landrigan PJ, Mallino DL 1990 Child labor in 1990. Annual Review of Public Health. 11: 359-75.

Raju T 1989 Child labour, adult literacy and employment rates in India. Indian Journal of Pediatrics 56: 193-200.

Rout-Reigart J 1995 Pesticides and children. Pediatric Annals 24:663-668.

Sachs JD, Warner AM 1995 Economic reform and the process of global integration. Brookings Papers on Economic Activity 1. Washington DC: Brookings Institution.

Satterthwaite D. 1996 The environment for children: Understanding and acting on the environmental hazards that threaten children and their parents. London: Earthscan Publications.

Scanlon T 1998 Child Labour [Letter] Lancet 351: 219-220.

Schwartz J 1993. Societal benefits of reducing lead exposure. Environmental Research 66: 105-124.

Shafaedin M 1995 The impact of trade liberalization on export and GDP growth in least developed countries. UNCTAD Review 1995:1-6.

Spivak, Gayatri C 1988 Can the subaltern speak? In: Nelson C. and Grossberg P (editors), Marxism and the Interpretation of Culture. London: Macmillan.

Thomas J 1998 Experts take a 2nd look at virtue of student jobs. The New York Times. Wednesday May 13: A16.

Tzannatos Z 1996 Child labor and school enrollment in Thailand in the 1990's Washington DC: The World Bank.

UNDP 1998 World Development Report. Oxford and New York: Oxford University Press for UNDP.

UNICEF 1997 The state of the World's Children 1997. Oxford and New York: Oxford University Press for UNICEF.

U.S. Department of Labor 1994 By the sweat and toil of children – Volume I: The use of child labor in American imports. A report to the Committee on Appropriations of the U.S. Congress by the Bureau of International labor Affairs, U.S. Department of Labor.

U.S. Department of Labor 1995 By the sweat and toil of children – Volume II: The use of child labor in U.S. agricultural imports & forced and bonded child labor. A report to the Committee on Appropriations of the U.S. Congress by the Bureau of International labor Affairs, U.S. Department of Labor.

U.S. Department of Labor 1996 Forced labor: The prostitution of children. Papers from a symposium co-sponsored by the U.S. Department of labor, Bureau of International Affairs, the Women's Bureau, and the U.S. department of State, Bureau of Democracy, Human Rights and Labor, held on September 29, 1995 at the U.S. Department of labor in Washington DC.

Van Houtven G, Cropper ML 1996 When is a life too costly to save? The evidence from U.S. environmental regulations. Journal of Environmental Economics and Management 30: 348 –368.

Walters D 1998 Health and safety strategies in a changing Europe. International Journal of Health Services Research 28: 305-331.

WHO 1987 Children at work: Special health risks. Report of a WHO Study Group. World Health Organization Technical Report Series 756. Geneva: World Health Organization.

WHO 1997 Health and the Environment in sustainable development: Five years after the Earth Summit. Geneva: World Health Organization.

Wilk VA 1993 Health hazards to children in agriculture. American Journal of Industrial Medicine. 24: 283-290.

World Bank 1993 World Development Report – Investing in Health. Washington DC: Oxford University Press for The World Bank.

World Bank 1995 Priorities and strategies for education: A World Bank Review. Washington DC: The World Bank.

World Bank 1997a Clear water, Blue Skies: China's environment in the new century. Washington DC: The World Bank.

World Bank 1997b Expanding the measure of wealth: Indicators of environmentally sustainable development. Washington DC: The World Bank

World Bank 1997c Review of early childhood policy and programs in Sub-Saharan Africa. Washington DC: The World Bank.

World Bank 1997d Private capital flows to developing countries: The road to financial integration. Washington DC: The World Bank.

World Bank 1998a Environmental implications of the economic crisis and adjustment in East-Asia. Washington DC: The World Bank.

World Resources 1998/1999 World Resources: A guide to the Global environment. Published by Oxford University Press for the World Resources Institute.

Yach D, Bettcher D 1998 The globalization of public health 1: Threats and opportunities. American Journal of Public Health 88: 735-738.

Zakocs RC, Runyan CW, Schulman MD, Dunn KA, Evensen CT 1998 Improving safety for teens working in the retail trade sector: Opportunities and obstacles. American Journal of Industrial Medicine 34: 342-350.

EARLY CHILD
DEVELOPMENT

EDUCATION

THE WORLD BANK
HUMAN DEVELOPMENT NETWORK

For more copies, contact
Mary Eming Young
The World Bank
1818 H Street, N.W.
Washington, D.C. 20433
Phone: (202) 473-3427
Fax: (202) 522- 3233
Email: myoung3@worldbank.org